



## Next Club Meeting Sunday 9<sup>th</sup> June Belvoir Guides Hall 6 Silva Drive West Wodonga

Meetings commence with a BBQ (with a donation tin for meat) at 12pm with meeting afterwards  
Members are encouraged to turn up a little earlier for clubroom maintenance  
Call in Via VK3RWO, 146.975, 123 Hz tone



The ANAN100D Software Defined Transceiver at Mick VK3CH shack  
Finally back in service after moving house, reprogrammed from scratch, since new SDR software updates

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# ANAN 100D Software Defined Radio Transceiver ~ VK3CH

Back in 2014 I bought the ANAN100D HF 100 watt transceiver on the recommendation of Don VK3HDX. Since then in four years SDR by Apache Labs and Flex to mention just two manufactures has taken off big time. While the ANAN 100D is four years old technically, the software that runs it evolves all the time, so in a way it keeps pace.

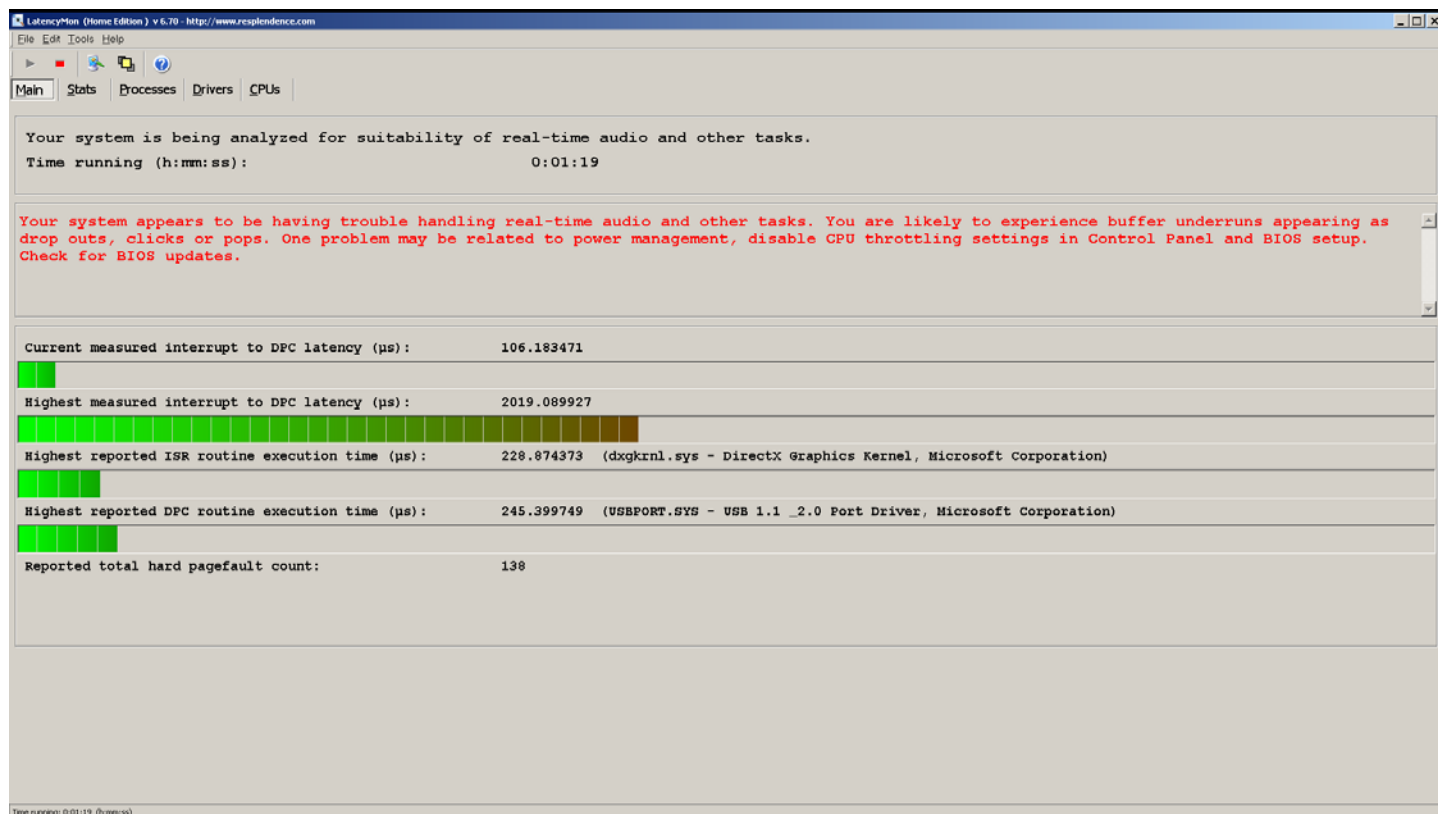
After moving house I finally got around to having another play with it. As four years had passed I decided to delete all the software I used with it and start afresh. The two favourites used by me are cuSDR64 and PowerSDR mRX PS.

Quite a few revisions in both programs have been made over the last four years so I downloaded the latest versions and manuals and installed them. cuSDR64 has not changed much, nor has much been altered with it. It is an easy program to use. PowerSDR mRX PS has a few new dialogue boxes and options, but after a day I started to remember most of what to do. Installing PowerSDR mRX PS takes ages on first install as it does all its maths calculations as it installs, taking over 10 minutes alone to do all the calculus. I still have the same PC from four years ago but it could handle the ANAN 100D but of course a new fast PC would be a good investment.

The first thing to do is check your PC is up to the task of running an SDR option. The software, called LatencyMon, is on the web and can be downloaded from <https://www.resplendence.com/latencymon> LatencyMon checks if a system running Windows is suitable for processing real-time audio and other tasks. LatencyMon analyzes the possible causes of buffer underruns by measuring kernel timer latencies and reporting DPC and ISR execution times as well as hard pagefaults. It will provide a comprehensible report and find the kernel modules and processes responsible for causing audio latencies which result in drop outs. It also provides the functionality of an ISR monitor, DPC monitor and a hard pagefault monitor.

Windows is not a real-time operating system. All requests to the operating system are delivered on a best effort basis. There are no guarantees whatsoever that requests are delivered within a certain time frame, which are the characteristics of a real-time operating system. That is not a problem for most devices and tasks but this is bad news for audio applications (which are considered soft real-time) because they need to deliver data to the subsystem and the hardware in buffers several times per second. If one or more buffers miss their deadlines and are not delivered in time it has audible consequences which are recognized as dropouts, clicks and pops.

The result of a test on my PC shows it struggles with real time audio processing, but in practice the SDR functions OK both TX/RX.



With the latency tests ran, you have an idea if your PC system is up to running SDR programs. If you have deep pockets then a dedicated PC just for your SDR 'rig' is the best option. Multiple video screens to display all the settings and received data will help as well.

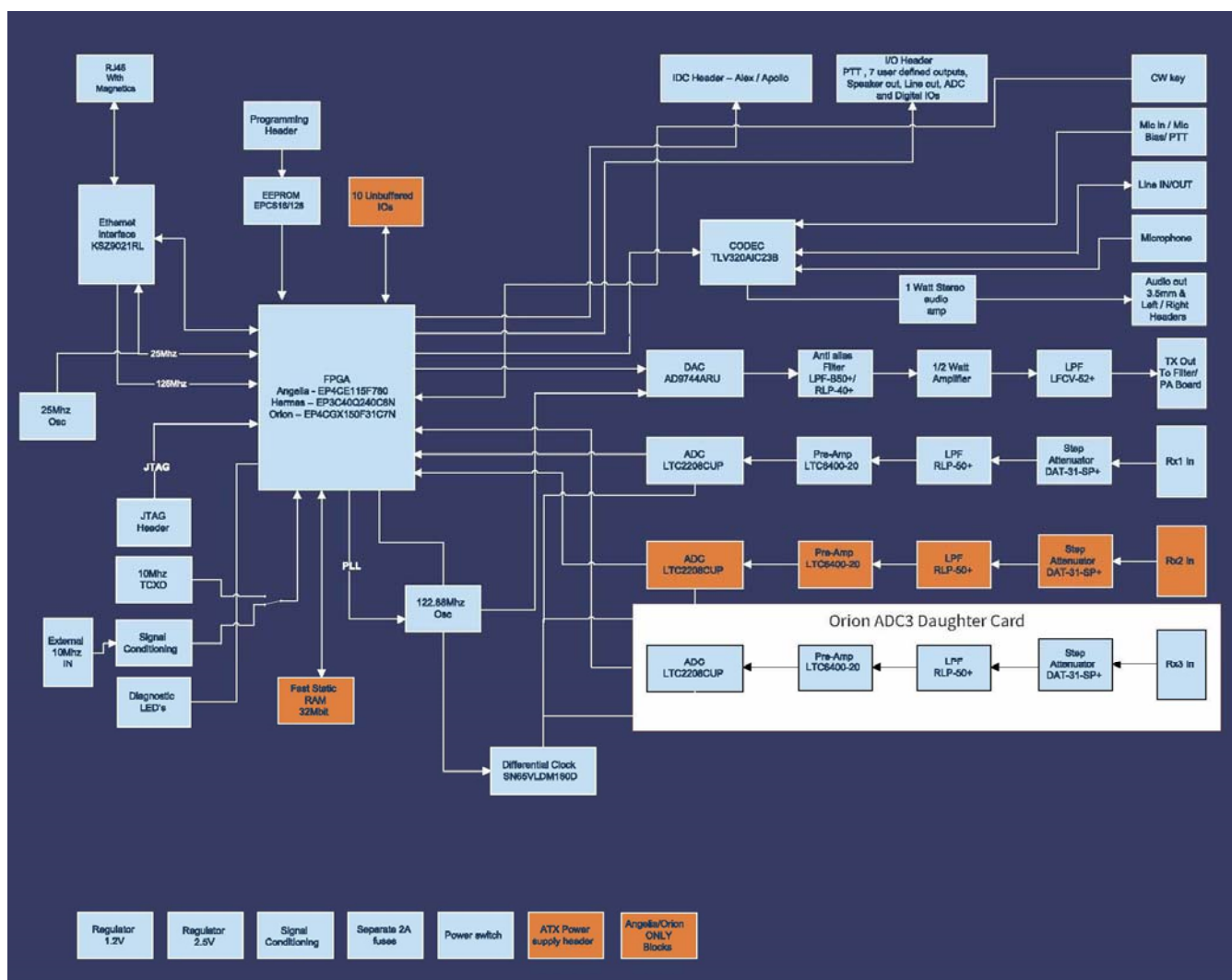
The ANAN 100D connects to your PC via Ethernet and a dedicated connection is best. Its current speed is 10 Megabits. As my PC is connected to the internet via a NIC (network interface card) I added a second one just for the ANAN 100D.

All the info you need can be found at <https://apache-labs.com/>

High Performance Software Defined Radio programming software for both Linux and Windows can be found at <http://openhpsdr.org/>  
Software Support

The ANAN 100D will work on a multitude of software platforms such as, The OpenHPSDR flavours of PowerSDR, cuSDR, Kiss Konsole, GNURADIO- OpenHPSDR, John Melton's (G0ORX/N6LYT) android application for The OpenHPSDR hardware GHPSDR3, GHPSDR3-QT

#### ANAN 100D ORION/ANGELIA/HERMES BLOCK DIAGRAM



Rear Panel Connections

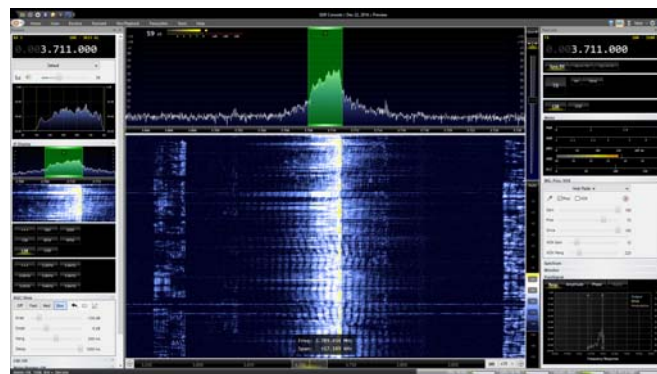


## PURE SIGNAL

Pure Signal is the name given to the theory and implementation of the clean transmission logic developed by the OpenHPSDR team and implemented in PowerSDR as used with the ANAN radios.

You often see some truly rotten signals on the air, an example is shown below. As a good operator you do not want a signal like this!

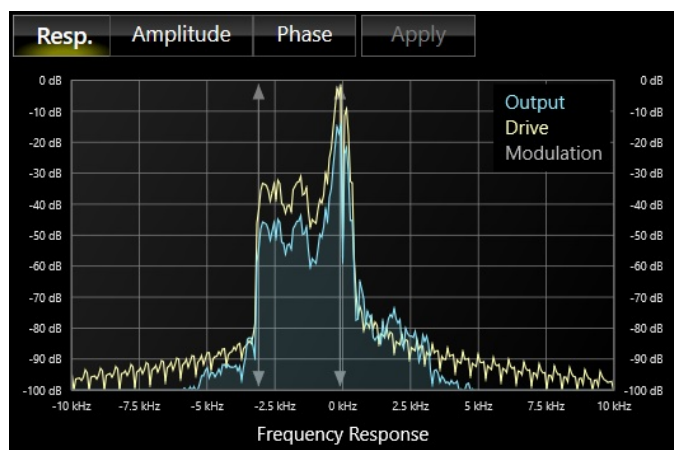
Note: at present the pure signal correction is not applied, only the diagnostic information is shown.



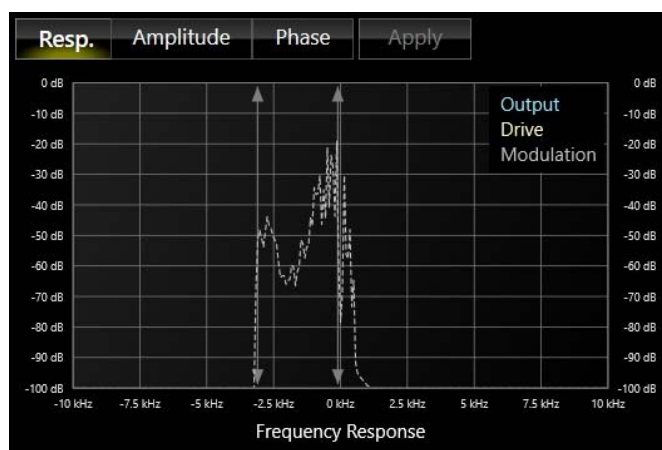
The same concept is used in the SDR Console although the implementation is developed from the ground up using the data returned by the radio when in transmit mode. Looking at the images below, in receive mode only the modulation signal is shown but in transmit mode both the drive and output (as measured at the antenna) are shown.

When both the drive applied to the Digital-to-analog converter (DAC) and the output as measured at the antenna are known it is possible to modify the drive so that the output is as clean as possible.

The information required to actually perform the pure signal correction is the drive vs output amplitude and phase. In the two images below we see that the amplitude gain is not linear - there is more gain at lower levels. It is this information which is used in the feedback loop to adjust the drive gain at different levels.

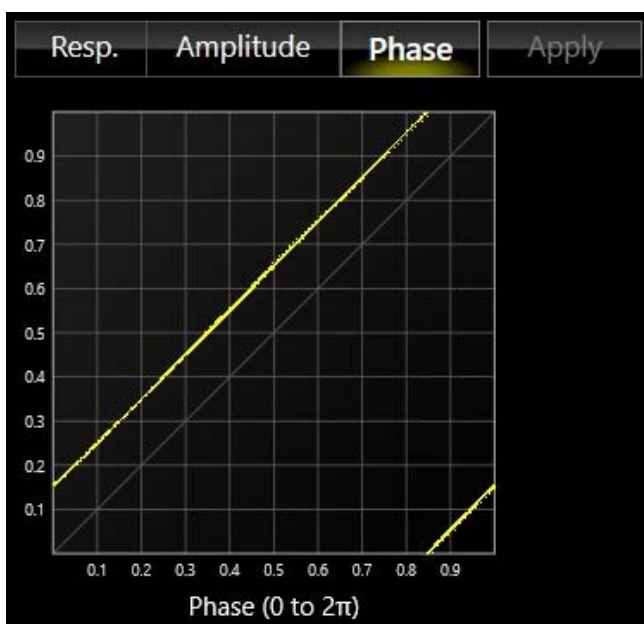
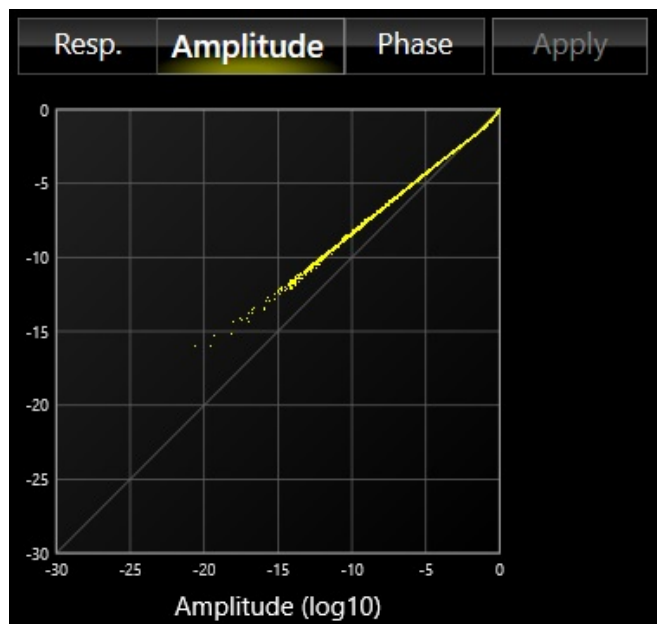


Modulation (Receive)



Drive and Output (Transmit)

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## Microphone

You can use a microphone connected to either the PC or the ANAN hardware. In the DSP panel select the microphone, the entry ★ Microphone on Radio ★ selects the microphone connected to the ANAN hardware. The Spectrum window in the DSP panel shows the microphone output after the gain and processing (if selected) are applied. Adjust the gain/proc and master gain/proc (see common configuration) so that the ALC value peaks somewhere between 100 and 150. The ALC value is shown even when not in transmit. Use the equaliser to adjust the frequency balance (see common configuration)

## Monitor

If you want to hear your own audio select a playback device from the dropdown list. Monitor output is normally used when transmitting. (CW sidetone is only heard through speakers connected to the ANAN radio.)

## Mode

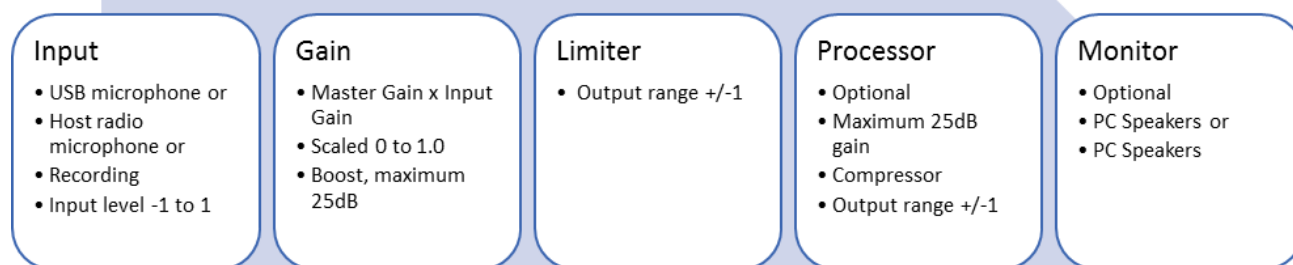
Select the desired mode - at present only LSB, USB and AM are available, but you can always send CW!

## Drive Level

With the ALC peaking between 100 and 150 switch to transmit (use either VOX or press the TX button). Adjust the drive slider to set the output level. An alternate method is to use the tone generator (see common configuration) by selecting Tone - you are then transmitting a steady tone (or tones).

## Signal Quality

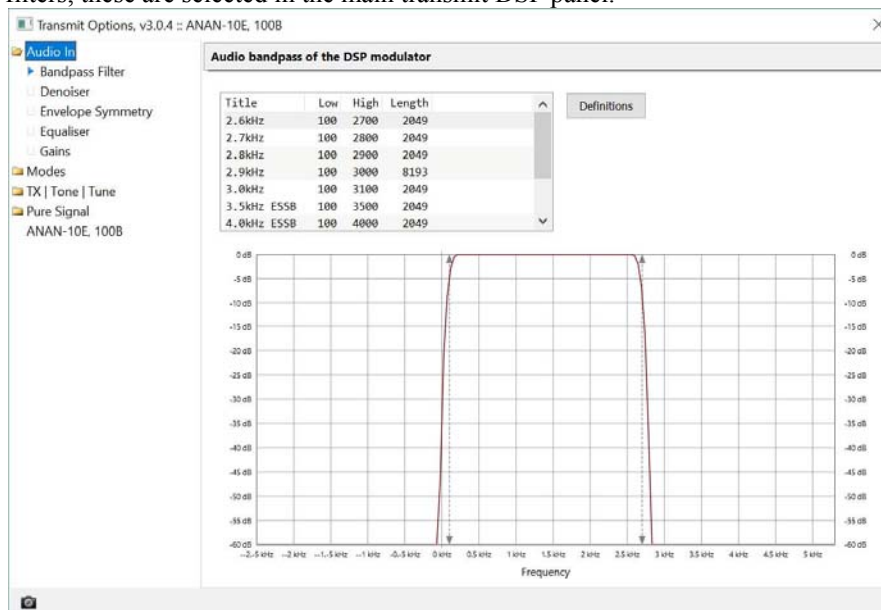
The Pure Signal approach is not yet supported by SDR Console, when available use this to ensure your signal is as clean as possible.



## Audio Options

### Bandpass Filter

Define a list of bandpass filters, these are selected in the main transmit DSP panel.



## Equaliser

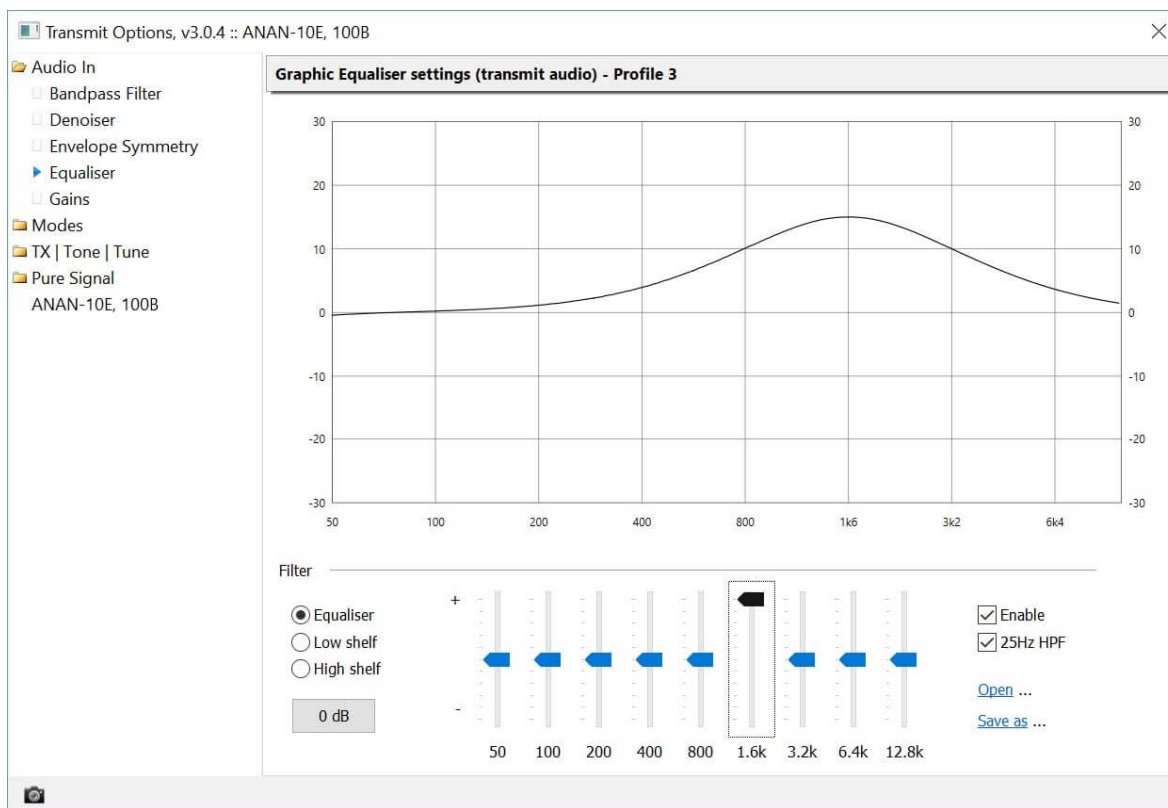
The equaliser supports three methods to adjust the frequency balance:

Graphical equaliser where the input signal is passed through a bank of filters, one filter per octave. Each filter is independent with its own adjustment.

Low shelf filter which adjusts the signal level below a specific frequency, and

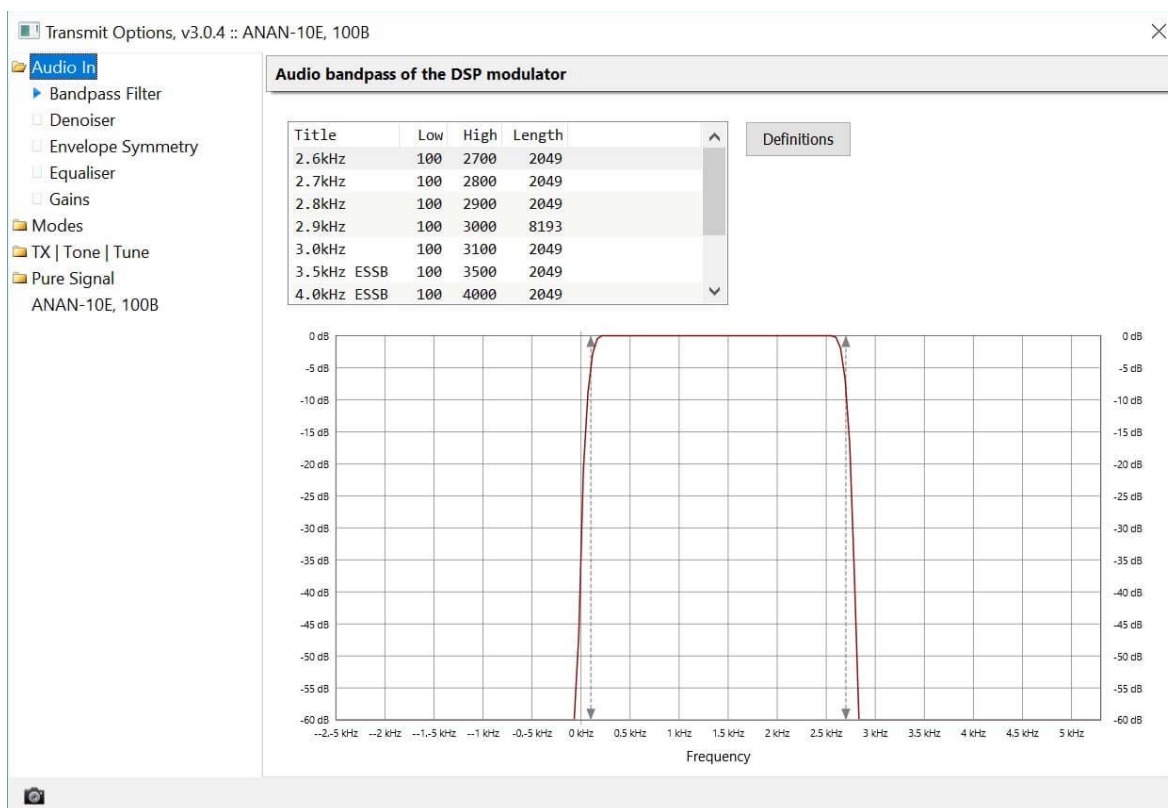
High shelf filter which adjusts the signal level above a specific frequency.

Changes are applied immediately.



## Gains

For each band there are master gain settings.



## Microphone

You do not need an expensive super-duper professional quality microphone.  
I use a Karaoke Vocal Dynamic Microphone is resulting in reports of very good quality audio.  
This typically costs less than \$25 and comes with a 9.8ft (3m) cable.

## Recording

To make a recording of the audio as sent to the transmitter click the recording button in the Input pane of the DSP panel. The recording is saved as a Windows Media Audio (WMA) file which you play with any Windows media application.

## Speakers

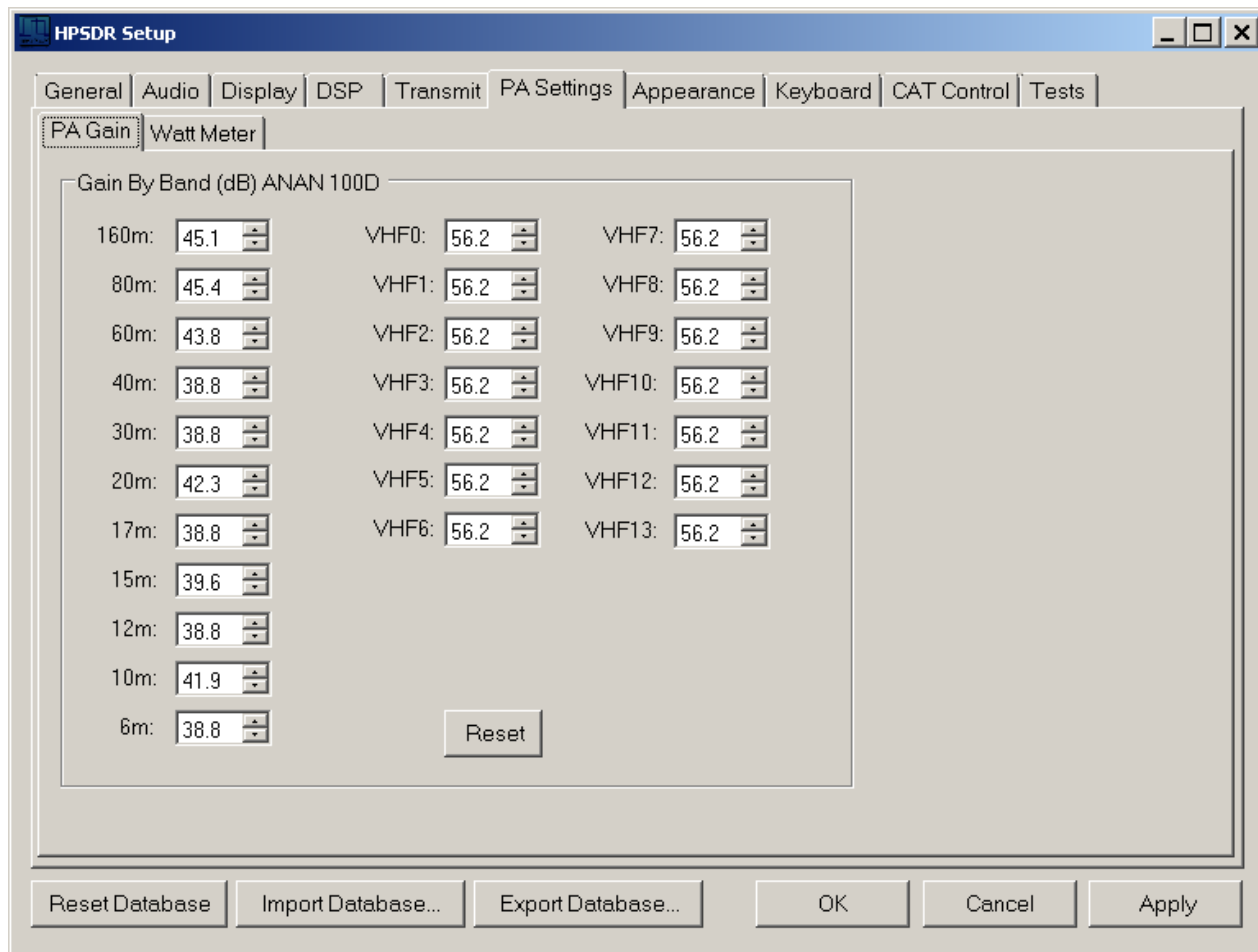
You can plug powered stereo speakers or a stereo headset into the speaker jack on the back of the radio with no damage. In this case the left audio channel will go to either speakers or ear-speakers but the speakers will be out-of-phase. If you are using powered speakers or stereo headphones you are better off using the front-panel headphone jack since both the R and L channels are present on that connector.

Don suggested that I buy a separate amplifier and speaker system, he recommended the BOSE COMPANION and what fantastic speakers they are, perfect for amateur radio audio, takes the sharpness right out of it and plays music stations in stereo sound. These are studio quality speakers that don't need much space.

## SETTING IT UP

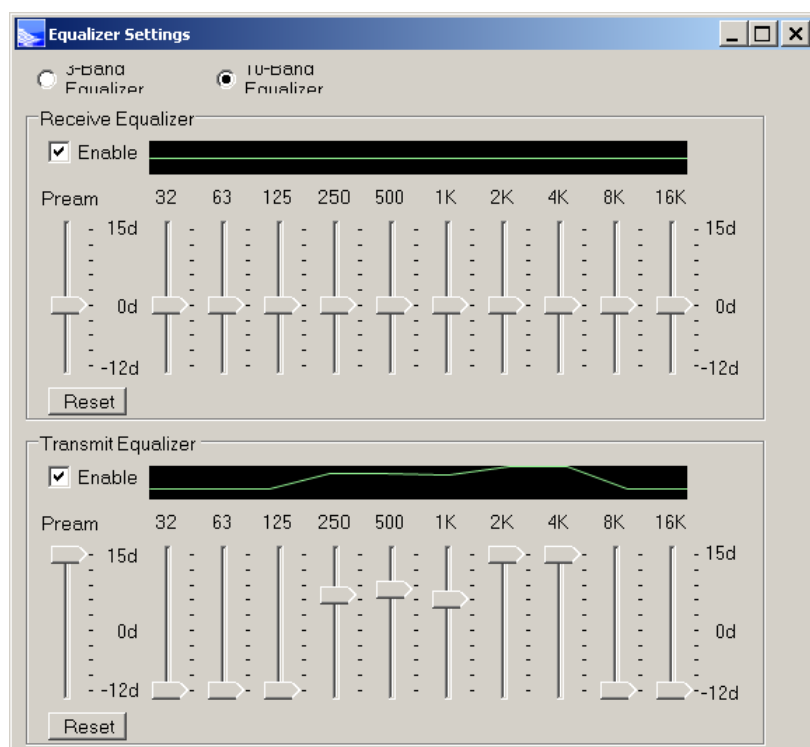
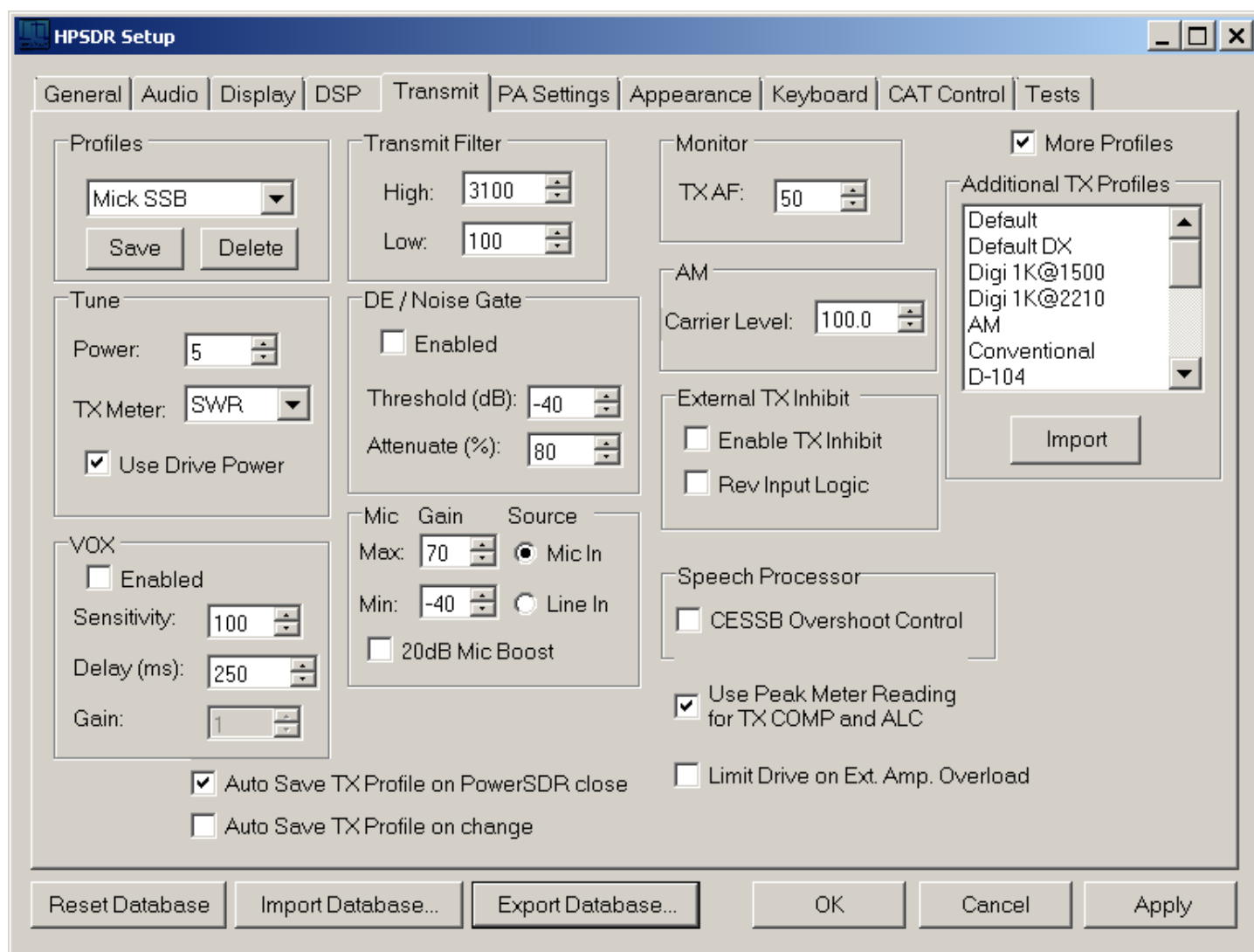
There are 34 individual settings screens like the one below.  
Fortunately PowerSDR mRX PS is clever enough to put in good default values which will get you on air, but taking the time to customise things really puts the power in your hands.  
Everything can be altered to exactly what you want – but some things are best left alone as well!

After installing PowerSDR mRX PS it's time to set your transmit levels, known as the PA Gain.  
This is to limit the peak power and is required to be setup on a new install of PowerSDR mRX PS.  
A dummy load is required and the levels are set for each band up to 6 meters.  
My settings are here, note the slightly different attenuation required for each different band.



The next thing to do once you're on air, is to setup an audio profile.  
You can setup as many as you like, one for SSB, another for AM, etc.

You can customise voice filters, microphone gain and even have a saved voice equalizer setting so you sound studio quality.



To help set your transmit audio, use of the meter in monitoring modes of ALC, COMP and Fwd Power.

This is best done into a dummy load and the optimum settings saved.

Initial audio settings are done BEFORE you enable Pure Signal.

Otherwise the smart signal processing in Pre Signal will negate what you are setting up.

You tailor your audio settings then save them as a profile.

You can have as many profiles as you like, such as a voice profile for general SSB use, AM use and FM use.

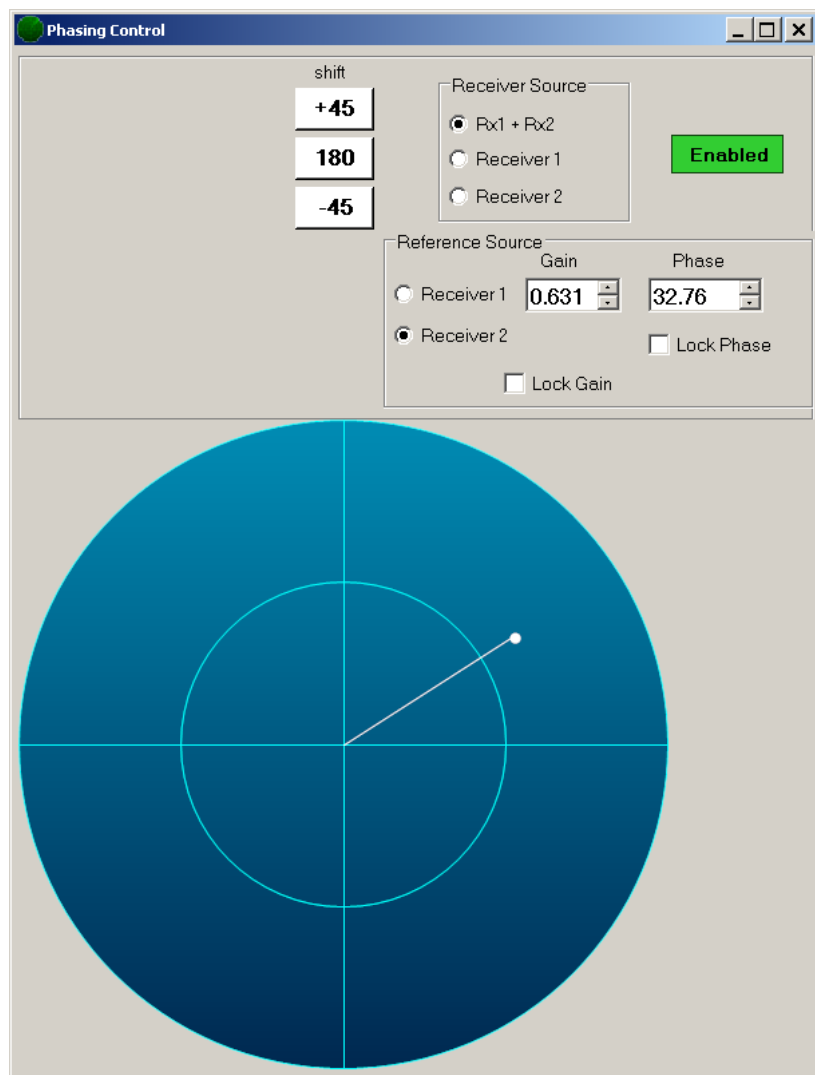
#### VIDEOS ON YOUTUBE

Pure Signal

<https://www.youtube.com/watch?v=0adHZOTqTlQ>

CFC Audio Tools Setup Guide

<https://www.youtube.com/watch?v=15JmDAaDBVo>



Unwanted noise can be reduced or even eliminated by having another antenna input on RX2 and then combining them to phase out the interference. With your mouse you can drag and select any combination of angle and polarity of the noise and cancel it out. It is very effective.

The Noise Blanker is also useful but not always, as normal it pays to experiment with settings with different band conditions.

Differences between the ANAN-100D and the ANAN-200D, here are some of the significant differences:

The 200D has a jumper less motherboard, so features and options are software selectable on the 200D where the 100D uses internal jumpers.

The 200D's Cyclone IV EP4CGX150 FPGA sports 150,000 Logic Elements vs the 100D's 115,000 logic elements, leaving room for future expansion.

The 200D has a pre-distortion feedback network built in, so you save the trouble of adding your own external loop

The 200D uses a more precise 100PPB reference clock  
The 200D uses the Orion platform but only uses 2 at this time. (Although the Orion card supports three, a future item.)

Future projects are in the works for multiple computers being able to utilize the 200D at the same time.

After setting it all up it, time for on air testing.

Received signals sound so clean and clear even before any digital processing.

Gentle use of the Noise Blanker and Noise Limiter work very well, the effects are amazing.

My ANAN100D is not even sold anymore as since 2014, it is considered "old hat"!

But the software that makes it all work is still evolving with bug fixes, new features and improvements, in a way the ANAN100D remains "up to date" as the open source software gets updated.

Obtaining a good VSWR match with the auto tuner was a challenge as the ANAN100D would shut off the transmit signal if it did not see a safe VSWR match quickly. While you can tell it to ignore a high VSWR I would rather keep the protection on.

It take a few seconds for the HC-200AT auto tuner to go through a lot of L & C switched combinations.

It looks like I will have to try a few new ways to feed my inverted 'V' so the auto tuner can cope.

Now some experimentation with my inverted 'V' feedline and balun arrangement is required.

Some trees have also grown near the ladder line feedline and all this will affect the tuning to a degree.

HF is always a different outcome depending on your antenna installation and location.

Later I removed the 4:1 balun and that improved most HF bands VSWR matching via the auto tuner.

Some tree fern braches had slowly grown near the balanced line so these were cut right back.

You never stop experimenting and learning with amateur radio...

~Mick VK3CH

# Review of LP-100A Digital Vector RF Wattmeter

A serious meter, a precision tool for any shack. Don VK3HDX says this VSWR meter is as accurate as the famous 'Bird' meters.

Its features include,

Fast, high contrast display with bar graphs for power and SWR, along with numerical readout for both  
Bar graphs customizable for style, decay, behaviour and range

dBm / Return Loss display

50 mW to 3000W with three auto ranging scales (options for 5 & 10KW)

Power display resolution of 0.01 to 1W depending on scale

Frequency coverage of 1.8-54 MHz, with automatic per-band correction

Z, R, |X| display from 0-999.9 ohms each

Separate coupler with 50 ohm ports for uncluttered desktop

Peak-hold numerical power readout with "hang" characteristic for power and SWR

SWR accuracy < .15 (5%) from about .1W to 3000W, .05 typical

Power accuracy is 3% typical at any rated power level or frequency from 1W to 3000W after calibration, usable to 0.05W

Can be easily matched in the field to external standard to within 0.1% on each band

Power display is Fwd or Net power delivered to the load ( Fwd minus Ref power).

SWR Alarm system with set points for Off, 1.5, 2.0, 2.5, 3.0 and user setting.

Includes "snooze" button for tuning, and power threshold.

Windows freeware Virtual Control Panel for software / remote control

Support within TRX-Manager for direct remote monitoring

Advanced automatic charting capability for SWR, RL, Z, R, X, reflection coefficient and Smith Chart

Built-in boot loader to allow for firmware upgrades to be downloaded and installed.

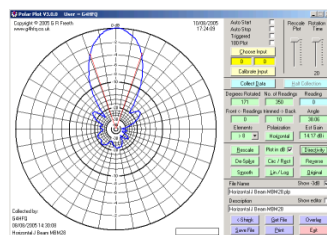
Call sign screen saver to extend life of display, scrolls a full screen call sign across the screen. Call sign is set in Setup screen.

Direct input for bench testing & field strength measurements, -15 to +33 dBm.

Conforms to FCC Part 15 A & B, ICAS and CE radiated emission limits, tested and verified by accredited lab

For VSWR measurements reading one page of the manual is enough and it comes with a very quick start guide with a thirty odd page on line PDF manual to study if more complex functions such as VSWR plotting or polar plotting (using a PC) are to be done.

Doing tests on the whips installed on the car were quick and simple. Alarm can be set when VSWR reaches a set point.



Polar plot using a PC ↑

Current & Voltage sensing coupling unit



Rear connections to the display unit



Real time VSWR and power testing, it actually moves with your modulation - incredible to watch, so accurate ↓



Above is actual AM carrier into the 40 meter whip on the car at 7070kHz

The "meter" covers 160 meters to 6 meters, but an optional coupler for 2 meters / 70cm is coming out very soon.

If you want an accurate, easy to use, laboratory grade VSWR Meter, then take a look at <http://www.telepostinc.com/lp100.html>

LP-100A has additional modes no other wattmeter has; vector impedance, dBm/RL, calibrated field strength and compression ratio.

Simple yet highly customizable... all functions and user preferences can be set from the Setup display. Plus supplied Windows® software for extended capabilities like automated SWR and Impedance plotting, antenna pattern plotting, internet remote control and more when connected to a PC. Latest software downloadable from their website.

~Mick VK3CH

## DRONE LICENCE

Australia's aviation safety authority will establish a "flyer's licence" and mandatory registration for drones from July this year, coinciding with a world-first drone food delivery business to be run out of Canberra.

Drone flyer data will be kept in a database to track users.

Those with drones of more than 250g will have to pass an online education course.

A drone delivery service is set to begin operation in Canberra once CASA approves it.

For the first time, anyone in Australia who wants to fly a drone will have to be accredited by the Civil Aviation Safety Authority, making it easier for police to track down miscreants.

Prospective flyers of drones weighing more than 250 grams will need to pass an online education course and register their drone, according to policy documents prepared by CASA. Flyer data would be kept in a database, finally allowing Australian authorities to get a picture of how many drones are flown in Australia, who is flying them and where.

CASA said the cost of registration would vary for different types of drones and whether they were used for fun or profit. It estimated it would cost \$20 annually per person for recreational drones and for model aircraft operators. The annual fee for each commercial drone would likely range from \$100 to \$160.

Operators like Google, preparing to launch skyward in Australia, needs to be ready for a complicated network of drones flying above Australia's cities. Google's parent company, Alphabet, last year began trialling the use of drones to deliver burritos, coffee and medication in a suburb on the fringes of Canberra.

It has now built a permanent warehouse headquarters in the more central suburb of Mitchell, under the name Project Wing, where it plans to begin its first ongoing commercial operation.

Like any commercial operator, Google is already licenced to fly by the safety authority. But as the drone industry rapidly grows, CASA said it needed to develop a system to manage all flyers, including those doing it just for fun.

*~Canberra Times - April 2019*

## ACMA FEE INCREASE



The ACMA latest review (April 2019) has just been undertaken and amateur licence fees have increased. The ACMA uses a system of apparatus licence types to apply common licence conditions to categories of radiocommunications services.

Amateurs use non-assigned apparatus licences.

Non-assigned licences are issued when an individual frequency assignment is not required.

There are two types of fees applicable to apparatus licences:

1. Administrative charges to recover the direct costs of spectrum management
  2. Annual taxes to recover the indirect costs of spectrum management and provide incentives for efficient spectrum use.
- Indirect costs are those that cannot be directly attributed to individual licensees. These activities include international coordination and domestic planning and interference management.

The new fees applicable to the Amateur Service are: A new licence fee is now \$80 (was \$76).

A licence variation fee is now \$51 (was \$49). The licence renewal fee is now \$55 (was \$52).

Issuing a Repeater or Beacon Station Frequency Assignment Certificate is now \$29 and variation of a Repeater or Beacon Station is now also \$29.

*~ACMA*

## PAINT THAT CAN BLOCK WIRELESS SIGNALS

University of Tokyo researchers have developed special paint that can block wireless signals.

By mixing aluminium-iron oxide particles into paint, the researchers have invented paint that blocks radio frequency in higher spectra where Wi-Fi and other higher- bandwidth communications occur. Though most Wi-Fi technologies operate at 2.4GHz and 5GHz, the special paint can block frequencies all the way up to 100GHz, the researchers said.

Here's how it works: the metal particles within the paint resonate at the same frequency as Wi-Fi and other radio waves, so signals can't pass through the thin layer of pigment giving a secure wall that stops signals from entering the house and from breaching walls coated with the special paint.

The use for such a novel product is already present. Movie theatres have been interested in finding a legal way to silence cell phones during screenings.

Electronic jammers that actively block wireless signals are illegal.

*~Internet*

## The ACITRON ~ Brenton VK3CM



This radio was not cheap. It's from a deceased estate and I'm funny about paying fair money for these types of deals. It is an ACITRON Australian-made amateur radio, pretty rare and something I had to have. No guarantees - if it fires up, so rolling the dice (but hey, we can fix it) and I will have to keep it on display for all to see.

This Australian manufacturer did not fail, it was just competitive forces outside Australia with the FTDX400 and FT200 at the time that proved very successful.

I will do a test after getting it going on my youtube channel, it's going to be a fun one to repair if it's not working, and very little data is available. But, there's still some old blokes like me alive who know a lot about these radios, so I will be emailing them for tips....There is some very interesting reading I dug up in these old amateur radio mag articles for sure. If I can get it working and get 400w out of the radio, what a bloody ripper.

This is now a very sentimental radio and I will keep till I die.

The designer of this radio was Ken Nisbet VK2KP whom I had the honour of meeting about 5 years ago.

We became great friends...Ken ran a very successful company in data communications and was instrumental in ensuring Australia kept up with the technology curve for 40 years.

He virtually pioneered radio telemetry in Australasia, we were forever getting beaten by Ken on quotes from Motorola, and he just did it cheaper and better than Motorola. Imagine my surprise when I finally got to meet Ken, what a great friend he was, I miss him dearly. Ken laughed so hard when I told him he whipped Motorola's butt. He was 74 years old at the time and boy could he laugh. Ken was my friend, he had so many strings to his bow, it does not surprise me to find out he was the part of the design team of this radio, he was a genius....I was 5 years old when Ken designed this radio, so it's not amazing it slipped by me haha...

Ken donated a huge 3-section tower to me down here, we have memorialized it with a load of videos, and a plaque to honour Ken's life. He was a great man, a great friend and to know and I have yet again, one of his items, a great pleasure to get this going just as we reconditioned the tower and got it back up in the air. I will get this radio going no matter what the cost, it's a Ken Nisbet memorial as far as I am concerned.

Many thanks to Travis down in Moe Victoria for assisting me so much,  
Travis, I will keep you in touch with the entire rebuild and make sure you have photo updates.  
Ken died in 2017, it was not a shock, he had been very ill, but we all miss him so much.

Vale Ken Nisbet, a great man who forwarded us as Australians in Electronics.

NISBET, Kenneth Clyde. Passed away peacefully in Sydney on the 3rd of August, 2017. Aged 77 years.

# amateur radio

Vol. 39, No. 7

JULY, 1971

Registered at G.P.O., Melbourne, for  
transmission by post as a periodical

Price 30 Cents





output. A separate meter is used to indicate plate current of the power amplifier.

#### 9 MHz. CARRIER OSCILLATOR

This unit consists of a series mode transistor oscillator and FET source follower. Diode switching allows the correct crystal to be selected when changing from normal to reverse side-band.

#### A.G.C.

The a.g.c. system uses a negative voltage derived from a voltage doubler and feeds in turn to the r.f. and first i.f. amplifiers, both units being dual gate FETs. This allows a large dynamic range prior to receiver overload and in actual practice the receiver will accept a signal from noise level to almost one volt before overload occurs.

#### 10 VOLT POWER REGULATOR

The 10 volt power regulator supplies power to all stages of the transceiver with the exception of the audio output stage, transmitter p.a. and broad-band driver.

The supply consists of a two-stage emitter follower with short circuit protection supplied from a zener referenced voltage.

#### 400 WATT POWER AMPLIFIER

The power amplifier consists of a YL1060 u.h.f. dual tetrode transmitting tube. This stage has a broad-band input and pi-coupler output. The valve is running approximately 800 watts p.e.p. in and delivering 400 watts p.e.p. out.

The power is slightly less on 10 metres. Approximately 1,800 volt (p.a.) and 400 volt (screen) supplies are used.

#### R.F. AMPLIFIER

This is a band switched r.f. amplifier consisting of a dual gate FET followed by an emitter follower. Tuning is electronically accomplished using diodes. The r.f. amplifier is used both on transmit and receive.

#### BALANCED MIXER -MODULATOR

One of the most interesting blocks in the transceiver is an integrated circuit balanced mixer which performs the dual function of receive balanced mixer and transmitter balanced modulator. While receiving, the input ports are connected to the r.f. amplifier and the injection balanced mixer. The output of the balanced mixer is fed via an emitter follower to the 9 MHz. crystal filter. On transmit, the input ports are changed over and the transmitter audio is fed to one port and the 9 MHz. carrier to the other. The unit then functions as a balanced modulator. The carrier suppression of the balanced modulator and filter combined is in the vicinity of 60 dB.

#### 9 MHz. 8-POLE CRYSTAL FILTER

A 9 MHz. 8-pole crystal filter is used with a bandwidth of approximately 2.5 KHz. at the 6 dB. points, rising to only 4.1 KHz. at the 60 dB. points.

#### I.F. AMPLIFIERS

The first i.f. amplifier is used both on transmit and receive and consists

of a dual gate FET. It has a.g.c. applied on receive and a.l.c. on transmit.

The second i.f. amplifier also consists of a dual gate FET.

#### A.M./S.S.B. DETECTOR

The product detector used is a diode bridge detector and one leg of the bridge is opened when operating in the a.m. mode. A source follower connected to the output reduces the impedance to drive the audio amplifier, via the volume control.

#### THREE-WATT AUDIO AMPLIFIER

The three-watt amplifier consists of a pair of TO3 transistors, transformer coupled to the loudspeaker and driven by two small signal transistors.

#### TEN-WATT BROAD-BAND DRIVER

The 10-watt broad-band driver consists of a transformer coupled pair of v.h.f. strip-line transistors. These are driven by a single v.h.f. strip-line transistor. The complete unit is broad-band, from input to output, delivering approximately ten watts of drive to the power amplifier. This unit is contained on a separate circuit board mounted on a heat sink and does not require tuning.

#### V.F.O. 6-5 MHz.

The v.f.o. consists of a permeability tuned FET Vacker oscillator followed by suitable buffering stages. The unit is completely enclosed in a metal box and is substantially free from vibration, making it particularly suitable for mobile use.



## INJECTION BALANCED MIXER

The injection balanced mixer is once again an integrated circuit similar to the type used in the balance modulator. The input ports are connected to the 6-5 MHz. v.f.o. and the band-set crystal oscillator. The output of this is fed via broad-band tuned circuits (to reduce the possibility of spots on receive) to an emitter follower driving both the receive and transmit mixers.

## CRYSTAL OSCILLATOR

This unit is a series overtone crystal oscillator followed by a FET source follower. The appropriate crystals being switched in when changing from band to band.

## DIGITAL SYSTEM

As the v.f.o. is reverse tuning from 6 to 5 MHz., a balanced mixer is used to convert this to the 2 to 3 MHz. range. This is then applied to a conventional

frequency counter. The 8 MHz. crystal used in the digital oscillator is diode switched when changing from upper to lower sideband and in some cases when changing from band to band (depending on whether additive or subtractive mixing is used). This is achieved automatically due to the logic system, enabling the digital readout to display the exact carrier frequency, rather than the centre pass band frequency.

## FREQUENCY COUNTER

The frequency counter consists of eleven dual in line integrated circuits comprising complete count and memory facilities and it drives a three-digit seven-segment gallium arsenide display. It has the facility to scale down and read to one extra digit (100 Hz.).

## LOGIC GENERATOR

The logic generator performs the functions necessary to generate the var-

ious gate, set and re-set pulses, etc., for the frequency counter. It also generates tones for c.w. transmission and tuning purposes. Eight dual in line integrated circuits and two transistors are used in this section.

## 100 KHz. CLOCK OSCILLATOR

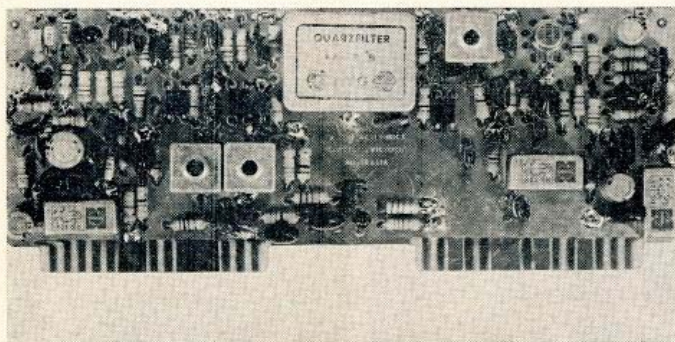
The 100 KHz. clock oscillator consists of a parallel mode 100 KHz. crystal. Twenty-one integrated circuits, five transistors and one FET are used in the complete digital readout system.

## P.A. TUNING

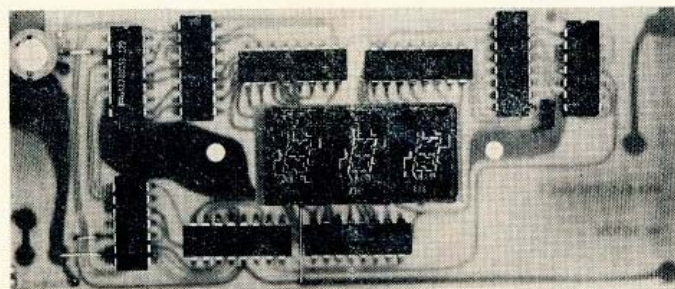
Before describing the tune-up system employed in the SSB-400, some comments are necessary on the tuning of s.s.b. transmitters in general.

It is a well known fact that an s.s.b. transmitter must be tuned at the full rated (p.e.p. value) input that it will be operating at on voice peaks in order

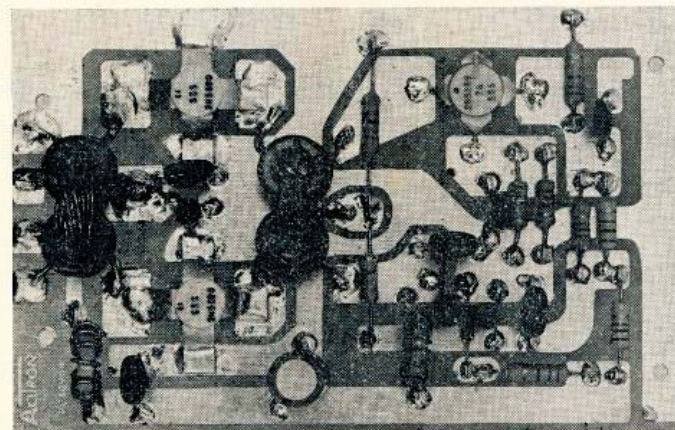
(Continued on Page 9)



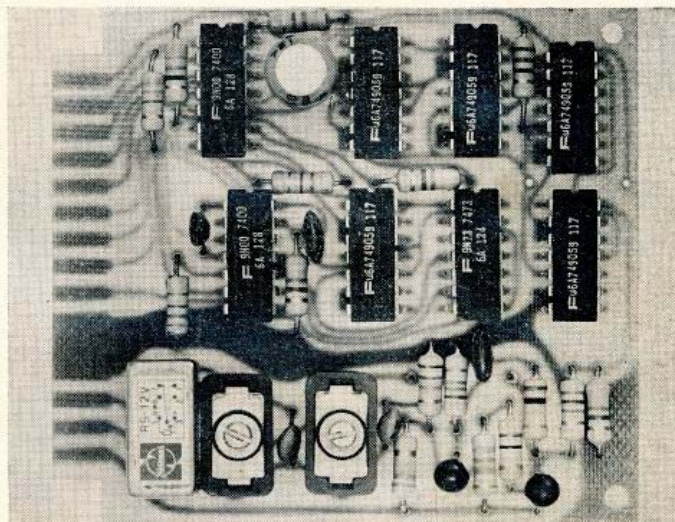
I.F. Modem.



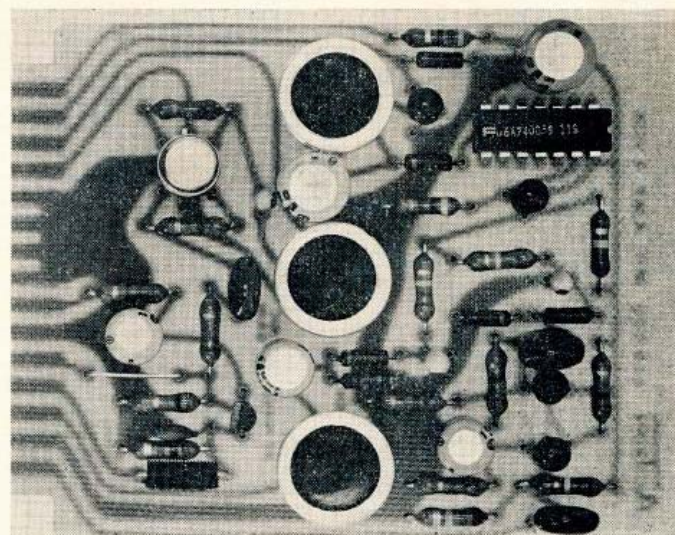
Frequency Counter and Digital Display Module.



10 Watt Broad-band Driver Module.



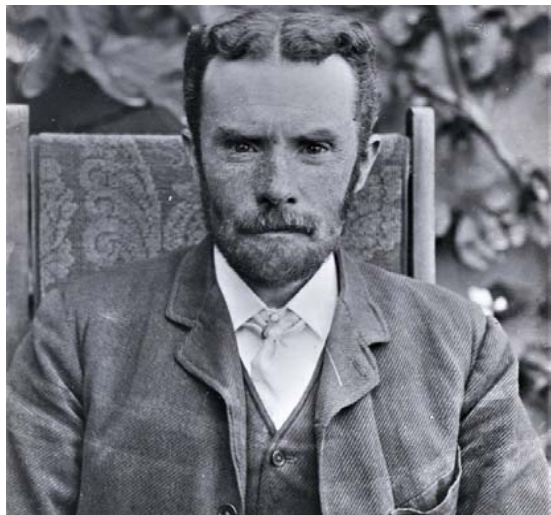
100 KHz. Clock Oscillator and Logic Generator module.



Microphone Amplifier, Vox/Anti-Vox Module.



~Brenton VK3CM



## The Man Who Invented Coaxial Cable

Oliver Heaviside, was born 18th May 1850 in Camden Town, London UK and died 3rd Feb 1925 in Torquay, Devon UK aged just 75.

Who was he?

Oliver was a self-taught electrical engineer, mathematician and physicist.

He invented different equations, reformulated field equations in terms of electric and magnetic forces and in energy flux, and co-reformulated vector analysis.

He was often at odds with various scientific establishments throughout most of his life, and changed the face of telecommunications, mathematics and science.

Oliver was a short red headed child and suffered from scarlet fever as a young lad that left him somewhat deaf. However he was an excellent student and constantly ranked high in school marks, in his final years at grammar school he was placed in the top 5. But at the age of 16 he left school and continued to study on his own with no other formal education.

Heaviside's Uncle by marriage was none other than Sir Charles Wheatstone. (Now there is a familiar name)

Wheatstone as we all know was expert in electro- magnetism, and the original co-inventor of the first commercially successful telegraph in the mid 1830's.

Wheatstone took an interest in his young nephew's education and sent him to work with his older brother Arthur Heaviside, who was managing one of the many growing "Wheatstone Telegraph" companies in Newcastle upon Tyne.

In 1870 Oliver took a job as a Telegraph Operator with the Danish Group "Great Northern Telegraph Company". However in 1874 his increasing deafness forced him to retire (age 24).

Heaviside continued studying electricity and its properties, and soon became an electrician.

He published an article in the prestigious Philosophical Magazine on "The best arrangement of Wheatstone's Bridge for Measuring a given Resistance with a given Galvanometer and Battery", for which he received positive comment from other physicists who had unsuccessfully tried to solve this algebraic problem.

In 1873 Heaviside encountered Maxwell's newly published Treatise on "Electricity and Magnetism" which caught Heaviside's imagination and he took to studying the subject in-depth where he developed Transmission Line Theory.

He then later published an article on the Duplex method of using a Telegraph Cable, poking fun at the chief of the Post Office Telegraph system, who had been dismissing Duplex as "Impractical".

In 1880 Oliver Heaviside researched the Skin Effect in transmission lines, that same year he patented, in England, the coaxial cable.

In 1886 Heaviside's brother Arthur, was experimenting with telephone lines in which the receivers were arranged in "bridge" or parallel circuits. To his surprise, he found that adding more telephones to a circuit actually improved the clarity of transmission. He turned for an explanation to Oliver, who soon showed that the leakage of current through each telephone reduced the distortion, though it also weakened the signal.

1887 Oliver published a paper "The Bridge System of Telephony" which he proposed "Loading Coils or Inductors" should be added to the Telephone and Telegraphy lines to increase their self-induction and correct distortion of the signal. Inductive loading offered a relatively cheap and easy way to improve telephone transmission, and AT&T and other companies later used it with great success.

Heaviside did not patent his idea, so he never made a penny from it; the money instead went to Serbian-born American physicist Michael Pupin, who secured a patent on inductive loading in 1899 and sold the rights, under somewhat shady circumstances, to AT&T.

In Electrical Papers (1892), he dealt with theoretical aspects of problems in telegraphy and electrical transmission, making use of an unusual calculatory method called Operational Calculus, now better known as the method of Laplace Transforms, to study transient currents in networks. His work on the theory of the telephone made long-distance service practical. In Electromagnetic Theory (1893–1912), he postulated that an electric charge would increase in mass as its velocity increases, an anticipation of an aspect of Einstein's special theory of relativity.

In 1902 Heaviside theorized that a conducting layer of the atmosphere existed that allows radio waves to follow the Earth's curvature instead of travelling off into space in a straight line. Shortly after Arthur E. Kennelly, working in the United States, made a similar prediction. Thus the ionosphere was known as the Kennelly–Heaviside layer for many years to come.

1922 Oliver became the first recipient of the Faraday Medal and the existence of the Ionosphere was confirmed in 1923.

Sadly on the 3rd Feb 1925 Oliver Heaviside died from falling from a ladder.

*~ Sourced from various internet sites. Compiled by Ken VK2UTC*

## What Kind Of Dinosaur Meat Would Taste Best?

An ostrich-like dinosaur known as an *ornithomimid* would probably yield the most consumer-friendly cut of meat, while still maintaining a unique dinosaur taste. Much of the flavour in a cut of meat comes from its fat composition, and an animal's diet contributes significantly to this.

However, due to the average consumer's taste for meat that is not too strong-tasting, it is more important to figure out what we *don't* want the animals we consume to be eating. Dinosaurs that ate marine animals would definitely be off the list, not only for their fishy flavour, but also because the high amount of oil in fish would make the meat more susceptible to oxidation, which would give it a rancid taste.

In fact, any carnivorous dinosaur would not fare too well in the supermarket. Most people prefer meat that comes from herbivorous animals—think cow, deer, bison—since animal fat found in a carnivore's diet adds a significant amount of "gamey" flavour.

And some dinosaurs' diets are far too unappetizing to consider.

"When people ask me if a T-Rex would be good, well, I don't think so," David Varricchio, professor of paleontology at Montana State University, says. "They've found jaw abnormalities that suggests they were eating fetid meat and had diseases that came about from prey items. They would be pretty parasite-laden."



Just as important in the search for the best cut of dinosaur meat would be the level and type of activity for which the dinosaur was built.

As for exactly which dinosaur would be most appetizing, one with red meat would have just enough flavor as compared to one with blander white meat. Theories that dinosaurs would have tasted like chicken abound since dinosaurs are so closely related to birds, but for many land-dwelling dinosaurs, beef may be a closer guess.

The kind of activity an animal does determines what kind of meat it yields. Red meat is composed of slow-twitch muscle fibres, which are built for sustained periods of activity, so animals that are active for longer amounts of time throughout the day would be composed of mostly red meat. Those who ambush their prey or move quickly for short periods of time would have white meat, which is composed of fast-twitch muscles that allow for quick bursts of activity. So dinosaurs taking part in extended periods of activity would probably have muscles less like a chicken (or even a fast-acting predator like a cheetah) and more like a steady-moving cow.

*Ornithomimosaurs* were a group of ostrich-like dinosaurs that were part of the suborder Theropoda from which modern birds evolved. They were close enough to birds that they likely had feathers and were warm-blooded, but they were very active animals with large hind legs for prolonged periods of running, so their muscles would probably have been mainly slow-twitch, less like modern birds. Though most theropods were carnivorous, ornithomimids were unique in that they had no teeth, a fact that has led most to believe they ate mostly plant matter. "About 80 percent of the *ornithomimids* were hindquarters, and they were really well-suited for running," Varricchio says. "I've also done a little work on their bone histology and it's safe to say they're relatively fast-growing. I think it would be a lean, slightly wild-tasting red meat."

That's not to say other dinosaurs wouldn't make a tasty meal either.

Velociraptors, being wild ambush predators, may have had gamier-tasting white meat comparable to a carnivorous bird such as a hawk. Taking into consideration activity level and diet could yield a huge variety of possibilities were dinosaurs ever to roam our pastures and grocery stores.

"You could get into cuts of meat. Armored dinosaurs mainly used their tails for defence, so that would probably be a lot of good white meat. Hadrosaurs were quadrupedal and spent much of their time on the move; I suspect they would be largely red meat," Varricchio says. Sauropods, the largest animals to ever walk the earth, may have made for an interesting meal as well. Their long necks, used to reach high-up food sources, could have resulted in a unique cut of sturdy red meat weighing several tons. Says Varricchio, "Sauropod neck could be a delicacy."

~Internet

## Top this for a speeding ticket...

Two Hunter traffic patrol officers from Newcastle LAC (Local Area Command) were involved in an unusual incident while checking for speeding motorists on the F3 Freeway.

One of the officers used a hand-held radar device to check the speed of a vehicle approaching over the crest of a hill, and was surprised when the speed was recorded at over 800Kph.

Their radar suddenly stopped working and the officers were not able to reset it.

Just then a deafening roar over the treetops revealed that the radar had in fact latched on to a Williamtown FA-18 fighter jet which was engaged in a low-flying exercise over Wyong, approaching from the ocean.

Back at police headquarters the Local Area Commander fired off a stiff complaint to the RAAF Liaison officer at Williamtown.

Back came the reply in true laconic RAAF style:

'Thank you for your message, which allows us to complete the file on this incident.

You may be interested to know that the tactical computer in the Hornet had detected the presence of, and subsequently locked onto, your hostile radar equipment and automatically sent a jamming signal back to it. Furthermore, an air-to-ground missile aboard the fully-armed aircraft had also automatically locked onto your radar equipment.

Fortunately the pilot flying the Hornet recognised the situation for what it was, quickly responded to the missile systems alert status, and was narrowly able to override the automated defence system before the missile was launched and your hostile radar installation totally destroyed.

Thank you for your enquiry and have a nice day.'

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## VK3RTV - MELBOURNE AMATEUR TELEVISION REPEATER UPDATE

As is usual the wheels of industry sometimes move slowly.

The facility at Surrey Hills has been renovated, but apparently an upgrade to the power supply (240V/400V) is necessary before we can install. Not that we will use all that much power, but other new systems there are also waiting.

During the period since we closed down, I have changed the video machine from the older hard disc version to a small 'Media Box' running off a USB stick.

It will make changing programs very easy.

Initially we will have 1255 MHz DVB-S FEC  $\frac{3}{4}$  SR3500ks/s. as a single input.

The output has changed to QPSK on 455.5 MHz.

That is a change of frequency and also modulation type.

QPSK is known to have a superior performance over QAM16 and should give an extended coverage.

We will be running a pre-amp at the mast head and also one at the receiver.

The test transmissions showed that although the noise floor came up significantly, signals were decoded that were unsuccessful with only a masthead. One of the pre-amps was kindly donated by Simon VK3ZSJ.

Hopefully VK3RTV will return soon.

*~Peter Cossins VK3BFG*

# NEVARC Nets

## 40M Net

Monday, Wednesday and Fridays  
10am Local time (East coast)

7.095 MHz LSB

Approximately + or - QRM

Hosted by Ron VK3 AHR

## 80M Net

Wednesday 20:30 Local time

3.622 MHz LSB

Hosted by Ron VK3 AHR

Using the club call VK3ANE

## 2M Nets

Monday at 2000 local time on  
VK3RWO repeater

146.975 MHz

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## RSGB Convention videos released

The RSGB have released more YouTube videos of presentations given at their 2018 Convention in Milton Keynes. The latest releases are:

PI4: the Digital mode for beacons and why it is a success, this by Bo Hansen OZ2M

VHF Baluns - Fact and Fancy by Ian White GM3SEK

Watch on the RSGB YouTube Channel <https://www.youtube.com/user/TheRSGB>

~WIA News

## Arduino and RF from kHz to 1 GHz

RFzero - a multipurpose Arduino RF and GPS controlled platform, can generate frequencies from 2605 Hz and beyond 200 MHz. At the same time 28 In/Out pins are available and eight of those are via an ULN 2803 A power driver.

For more information please visit <http://rfzero.net>

The typical use of the RFzero is as a beacon or as a low cost 10 MHz GPSDO.

A dozen of example programs in sketches are integrated into the Arduino IDE.

The RFzero has been developed for radio amateurs, RF enthusiasts and everyone else who wants to extend the Arduino skills in combination with RF.

~WIA News

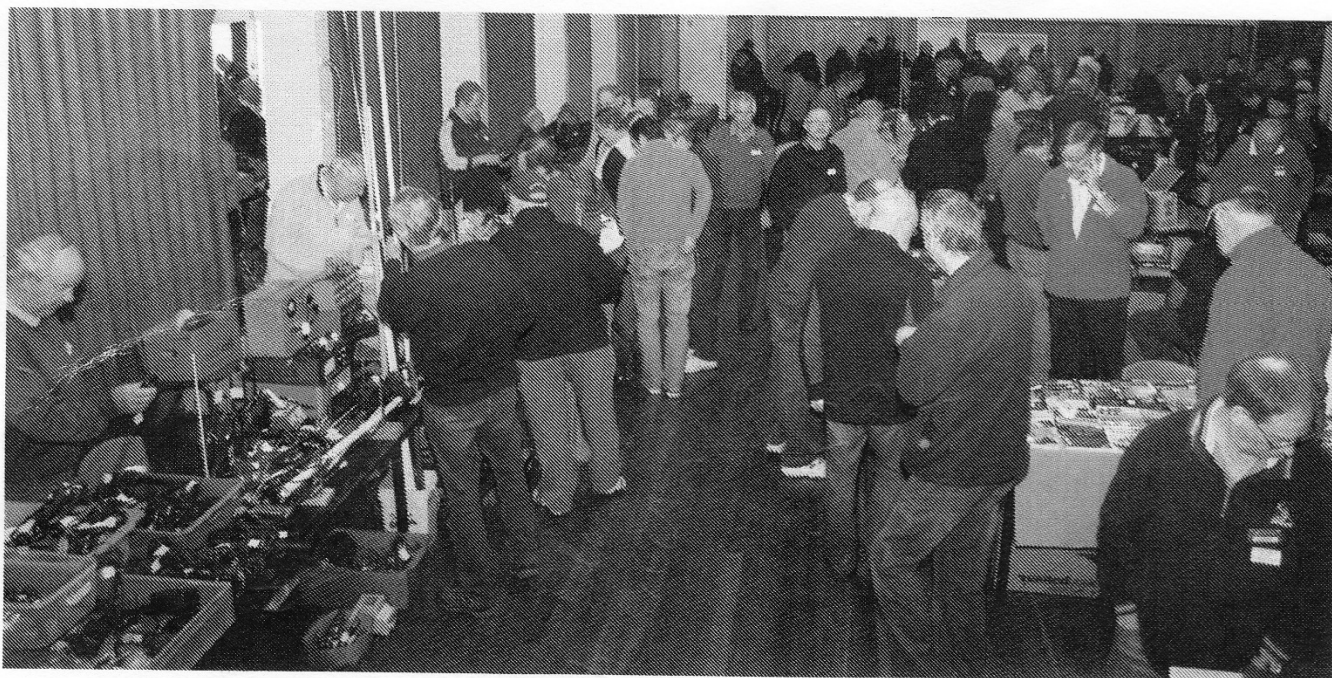


# GGREC HAMFEST

## Saturday 20<sup>th</sup> July 2019

Gippsland Gate Radio & Electronics Club invites you to our annual Hamfest at the CRANBOURNE PUBLIC HALL, located on the corner of Clarendon and High St. Melway 133 K4.

See our web page at [ggrec.org.au/site/hamfest](http://ggrec.org.au/site/hamfest)



**40 tables of new and used Electrical, Electronic and Amateur Radio equipment.**

- Everything is under cover.
- Tea and Coffee available during the event.
- A selection of hot & cold food will be available.
- Great Door Prizes will be drawn at approx 1:00pm.
- Doors open to sellers at about 8.30am & buyers at 10am.
- Buyers can gain entry for \$7.00.
- Sellers will pay \$22.00 per table. A **booking** includes entry for 2 plus door prize tickets. Anyone wishing to book a table position should contact the Club soon, as tables go quickly. Email to [hamfest@ggrec.org.au](mailto:hamfest@ggrec.org.au)

# Moorabbin Hamfest Report

Mick VK3CH attended this year's Moorabbin Hamfest again, flogging socks as most of the ham radio 'junk' is now gone. Reasonably good crowds, but many said I don't need socks as I still have the last lot from me. That's what you get when you sell good quality stuff, once your market base is saturated, sales decline. Lots of bargains to be had with some new stuff on offer along with the usual suspects.

ICOM had new gear on display with lots of printed info to take away. Come lunchtime, after the door prize draw, the crowds dispersed.





# GippsTech 2019 July 13th & 14th 2019

Expected program in outline:

Friday evening: Informal meal at the Bistro, Morwell Hotel Motel, Vincent Drive, Morwell from 1830. Note Bistro meals available until 2100. Pay your own way. Note that some locals may have meal discount vouchers available: Pay for one full main course and pay a smaller amount (currently \$7.00) for a second main course of equal or lesser value. Does not apply to seniors meals.

Saturday: Conference commences at Federation University Australia. Car parking off Mary Grant Bruce Drive. See maps link above. Registration opens 0830. Morning & afternoon tea/coffee included in Registration fee. Spit roast lunch available, additional to registration fee.

Saturday evening: Conference dinner at the Morwell Club, Helen St, Morwell. PrePay for the meal when you register.

Sunday: Conference sessions continue at Churchill, concluding at about 1300. Pizza lunch to follow for those who pay for it when registering.

Partner's program: We will run a Partner's Tour program provided that we have sufficient registrations. We will provide a minibus and driver, plus some ideas of possible sites to visit. Those on the tour will decide where they will visit.... Tours would normally run all day Saturday and Sunday morning, return in time for Conference close each day. Participants pay for their own meals, refreshments and any entry fees.

Topics - Topics currently expected to be presented:

Mark Spooner VK5AVQ - Non-Ionising / RF Radiation Safety  
Peter Schrader VK4EA - VK4RBB is now mixing it up  
George Galanis VK3EIP - A portable 23cm EME system for STEM applications  
Dale Hughes VK1DSH - Magnetic sensors for antenna positioning  
George McLucas VK4AMG - Arduino as controller  
Justin Giles-Clark VK7TW - Using a ZLPLL to GPS lock a white box transverter  
Justin Giles-Clark VK7TW - K3NG based AZ/EL GPS rotator for 10GHz EME  
Hayden Honeywood VK7HH - Repeater voting and simulcasting using the VKLink, app\_rpt and the Asterisk applications  
Peter Pokorny VK2EMR - The Leap Second and Status of UTC  
Rex Moncur VK7MO - Extending the 10 GHz EME World Record  
David Smith VK3HZ - Accurate Azimuth Indicator  
Roger Harrison VK2ZRH - Are We There, Yet?

Proceedings from Past Conferences, 1998 to 2018 are available unless sold out.

For a copy of these please contact Peter Freeman VK3PF ([vk3pf@wia.org.au](mailto:vk3pf@wia.org.au)) or via snail mail

Eastern Zone Amateur Radio Club Inc.  
PO Box 134  
Morwell, Vic, 3840  
Australia.



President, VK2VU, Gary  
Vice President, Tom VK3NXT  
Secretary, VK2FKLR, Kathleen  
Treasurer, Amy



## NEVARC CLUB PROFILE

### History

The North East Victoria Amateur Radio Club (NEVARC) formed in 2014.  
As of the 7th August 2014, Incorporated, Registered Incorporation number A0061589C.  
NEVARC is an affiliated club of the Wireless Institute of Australia.

### Meetings

Meetings details are on the club website, the Second Sunday of every month, check for latest scheduled details.  
Meetings held at the Belviour Guides Hall, 6 Silva Drive West Wodonga.  
Meetings commence with a BBQ (with a donation tin for meat) at 12pm with meeting afterwards.  
Members are encouraged to turn up a little earlier for clubroom maintenance.  
Call in Via VK3RWO, 146.975, 123 Hz tone.

### VK3ANE NETS

#### HF

7.095 MHz Monday, Wednesday, Friday - 10am Local time  
3.622 MHz Wednesday - 8.30pm Local time

#### VHF

VK3RWO Repeater 146.975 MHz – Monday - 8pm Local time  
All nets are hosted by Ron Hanel VK3AHR using the club callsign VK3ANE

### Benefits

To provide the opportunity for Amateur Radio Operators and Short Wave Listeners to enhance their hobby through interaction with other Amateur Radio Operators and Short Wave Listeners. Free technology and related presentations, sponsored construction activities, discounted (and sometimes free) equipment, network of likeminded radio and electronics enthusiasts. Excellent club facilities and environment, ample car parking.

**Website:** [www.nevarc.org.au](http://www.nevarc.org.au)

**Postal:** **NEVARC Secretary**  
**PO Box 69**  
**Wahgunyah Vic 3683**

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All editors' comments and other opinions in submitted articles may not always represent the opinions of the committee or the members of NEVARC, but published in spirit, to promote interest and active discussion on club activities and the promotion of Amateur Radio. Contributions to NEVARC News are always welcome from members.

Email attachments of Word™, Plain Text, Excel™, PDF™ and JPG are all acceptable.

You can post material to the Post Office Box address at the top of this page, or email [magazine@nevarc.org.au](mailto:magazine@nevarc.org.au)

Please include a stamped self-addressed envelope if you require your submission notes returned.

Email attachments not to exceed 5 Mb in file size. If you have more than 5 Mb, then send it split, in several emails to us.

Attachments of (or thought to be) executable code or virulently affected emails will not be opened.

Other persons or radio clubs may edit or copy out such as they like from the magazine but a reference to NEVARC News is appreciated, except copyrighted (©) material or as otherwise indicated.

Other articles credited to outside sources should ask for their permission if they are used.

While we strive to be accurate, no responsibility taken for errors, omissions, or other perceived deficiencies, in respect of information contained in technical or other articles.

Any dates, times and locations given for upcoming events please check with a reliable source closer to the event.

This is particularly true for pre-planned outdoor activities affected by adverse weather etc.

The club website <http://nevarc.org.au> has current information on planned events and scheduled meeting dates.

You can get the WIA News sent to your inbox each week by simply clicking a link and entering your email address found at [www.wia.org.au](http://www.wia.org.au) The links for either text email or MP3 voice files are there as well as Podcasts and Twitter. This WIA service is FREE.